

Applications

The high performance shotcrete GATORPASS is a pre-bagged mixture for dry way shotcrete. GATORPASS is a very efficient mixture that possess great resistance to compression and abrasion, is very ductile and tough due to the presence of steel fibres. GATORPASS was mainly developed for the lining of ore and/or waste pass but can also be used in many situations where the service conditions are severe. GATORPASS may also be used as a repair material where structures are under severe conditions. It is recommended for the following conditions:

- Impact;
- Cracking;
- Abrasion;
- Mechanical stresses;

The technical data shown here are issued from the report of the CRIB of the University Laval on the properties of the High Performance Shotcrete GATROPASS.

Spraying operation and Rebound:

During the spraying operation, GATORPASS required 6.2 L/min of water. Its is difficult to give a specific w/c ratio in dry-baged shotcrete since they were not calculated for those test and using only the flow of water is inaccurate du to the amount of rebound produced.

Initial and Final setting time:

GATORPASS showed a setting time of 45 minutes. Its slow setting time is based on the fact that a shotcrete with a shorter setting time tends to shrink thus producing major cracking problems. The final setting time of GATORPASS was of 175 minutes.

Volume of permeable voids:

The generally accepted guidelines for quality assessment (Austin and Robin, 1995¹) in permeable voids are shown in Table 1.

Table 1: Suggested indicator for shotcrete quality

Sprayed Concrete Quality	Permeable Void Volume (%)	Boiled Absorption (%)
Excellent	< 14	< 6
Good	14 – 17	6 – 8
Fair	17 – 19	8 – 9
Marginal	> 19	> 9

GATORPASS obtained a Permeable Void Volume of 14.7 % and a Boiled Absorption of 6.6 %. These results put GATORPASS on the limit of the Excellent and Good marks.

¹ Austin, S.A., & Robin, P.J. (1995). *Sprayed Concrete : Properties, Design and Application*. Department of Civil & Building Engineering, Loughborough University of technology, Loughborough, UK, 382 pages.

Compressive strength and flexural toughness:

The compressive strength and flexural toughness results are shown in Table 2:

Table 2 : Compressive Strength and Flexural toughness

Mix	Compressive strength [Mpa]				Flexural Toughness [J]
	8 hrs	1 day	7 days	28 days	
GATORPASS	7.0	36.9	45.2	51.7	500

We observe that the mix sets relatively slowly, avoiding any excessive shrinking which would produce major cracking problems at long terms. By measuring the compressive strength of GATORPASS with ASTM C 42 *Standard test method for Obtaining and testing Drilled Cores and Sawed Beams of Concrete*, we obtained final resistance at 28 days of 51.7 Mpa which is considered an excellent value in the standards.

As for the Flexural toughness, according to the standard ASTM C 1550 method, a value of 500 J was obtained. Please note that it is said in the CRIB report that a minimum result of 275 J is required.

Abrasion resistance and Tumbling test:

The ASTM C 779, *Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces*, Procedure C, gives a value of -119 µm/min after 28 days of curing. As for the Tumbling test, only 24 hours and 48 hours results have been issued. Since GATORPASS reaches its maximum compressive and flexural resistance at around 28 days, the results are of 3.32 L and 0.67 at 24 and 48 hours respectively.

Conclusion:

The study showed that GATORPASS respects all of the industry criteria. It is very easy to spray, constantly uniform and really easy to finish up. GATORPASS showed a relatively low and slow early resistance but proved to be excellent in both compressive a flexural resistance at 28 Days. The test also showed that GATORPASS has a very low rebound rate and that its abrasion resistance is highly efficient. Since the Tumbling test results didn't show any results at 7 and 28 days, the result are not considered really significant for a non-accelerated shotcrete. Based on those results, GATORPASS validate its utilization in the most difficult type of environments.

GATORPASS USERS

■ Agnico-Eagle Ltd, Lapa division	2006-2008
■ Agnico-Eagle Ltd, Goldex division	2006-2008
■ Agnico-Eagle Ltd, Laronde I & II division	2000-2008
■ Vale INCO, Stobie mine	2005-2007
■ Vale INCO, Birchtree mine	2005
■ Vale INCO, Copper Cliff North mine	2006
■ Aur Ressources Inc, Louvicourt mine	2001-2004
■ Ressource Breakwaters, Langlois mine	2006-2008
■ CAMROC, Fraser mine	2000
■ Noranda Inc, Matagami mine	2000-2003
■ IAM GOLD, Doyon mine	2000-2007
■ Barrick, Bousquet mine	2000-2002
■ Xstrata Nickel, Thayer Lyndsley mine	2007-2008



Revised on May 2nd